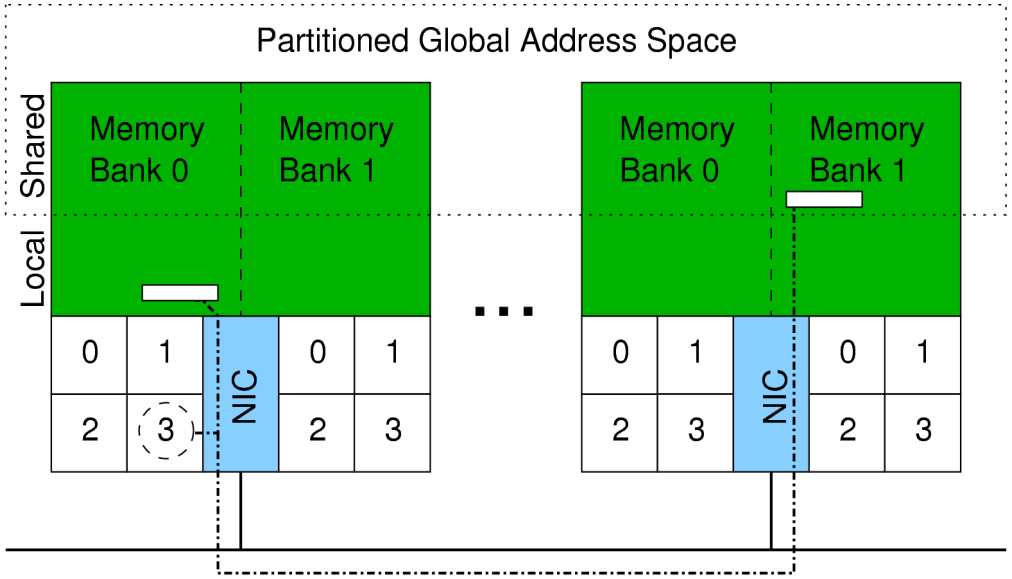
Argonne NATIONAL LABORATORY

OSPRI: One-Sided Primitives for Leadership Class Systems

Global Address Space Programming Models

Both language (UPC, CAF, Chapel) and library (GA, DDI) implementations.

Heavily used in quantum chemistry but useful in data-intensive (e.g. ScalaBLAST) and irregular (e.g. NEUS) applications.



OSPRI – Project Goals (related to BG/Q ESP)

I. Implement Global Arrays to scale to 800,000 MPI ranks on Blue Gene/Q (goal of Tools ESP)

II. Explore new one-sided programming models in connection with MADNESS and MPQC as part of the Harrison ESP

III. Enable NWChem many-body methods for use by Curtiss ESP and collaboration with Roux on polarizable force field development

IV. Research programming models for exascale

OSPRI – Project Needs

I. One-sided messaging beyond the MPI-2.2 standard from PAMI, including active-messages, strided put/get and remote atomics

II. Flexible message-ordering semantics, including both pairwise ordered and unordered

III. Scalable collective synchronization as well as subgroup and fine-grain fencing

IV. Low overhead for thread-safety